Title: Fabrication of microlenses by plasmaless isotropic etching combined with plastic moulding.

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Abstract: In appropriate mixtures of bromine and fluorine BrF{sub 3} is generated, which can then be used for the structuring of silicon under room conditions without plasma support. Direct reaction of the intermediary BrF{sub 3} with silicon results in the formation of SiF{sub 4} and bromine. By further addition of fluorine, the etching reaction can be started again. Bromine then acts as a catalyst. In spite of the high etching rate, the roughness of the etched surfaces remains small. By adding xenon to the etching gases, the roughness can be reduced to a minimum. Thermally produced SiO{sub 2} can be applied as the etching mask. Complete isotropy of the etching process allows underetching of closely adjacent LIGA structures. Moreover, optical application is possible due to the good quality of the etched surfaces. When underetching small circular holes in the SiO{sub 2} mask, spherical depressions are generated. After the SiO{sub 2} mask has been removed, these structures can be moulded in plastic and used as microlenses. (3 refs.)

Subject: Etching; Lenses; Micromachining. Optical fabrication; Surface topography; Microlenses fabrication; Plasmaless isotropic etching; Plastic moulding; Si structuring; Intermediary BrF{sub 3}; Catalyst; High etching rate; Minimum roughness; Underetching; Closely adjacent LIGA structures; SiO{sub 2} mask; Spherical depressions; Micromachining; Si

Chemical: Si; BrF3; BrF{sub 3}; Br; F3; F{sub 3}; F; SiF4; SiF{sub 4}; F4; F{sub 4}; SiO2; SiO{sub 2}; O2; O{sub 2}; O

Classification: Optical fabrication, surface grinding (A4285D); Optical lens and mirror design (A4278C); Surface treatment and degradation in semiconductor technology (A8160C); Micromechanical device technology (B2575); Surface treatment (semiconductor technology) (B2550E); Other optical system components (B4190)

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